

UK Technical Advisory Group on the Water Framework Directive

Identification of Groundwater Bodies that require Less Stringent Objectives (Public Working Draft)

This Guidance Paper is a working draft defined by the UKTAG. It documents the principles to be adopted by agencies responsible for implementing the Water Framework Directive (WFD) in the UK. This method will evolve as it is tested, with this working draft being amended accordingly.

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WFD Requirement:	Groundwater, less stringent objectives, risk assessment	UKTAG Review:	Agreed (V4)(GWTT): 01/05 Amended (V5): 15-02-05 Amended PR2 version: 7-03-05

1. Purpose of this paper

1.1 The paper sets out UKTAG's guidance on the:

- a) the high-level principles that influence the need for less stringent objectives (LSOs) (or 'lower objectives') for groundwater bodies;
- b) an approach used in 2004 to identify initial list of groundwater bodies that will require less stringent objectives. The approach that is described in this paper may be simplified in order to suit individual circumstances.

2. Background to the Directive's requirements and this guidance

2.1 Under the Directive, the 2015 deadline to achieve the WFD's good status objective for groundwater may be extended, subject to conditions. This is limited to a maximum of two updates of the River Basin Management Plan (i.e. to 2027). In the case of slow response groundwater systems in particular this may not be sufficient time for RBMP measures to have sufficient effect.

2.2 The WFD also provides an exemption which allows the setting of less stringent objectives. The conditions include a requirement that achievement of good status (or potential) would be infeasible or disproportionately costly.

2.3 It often takes groundwater bodies many decades to naturally recover from pollution once the source of this pollution has been removed and so it seems likely that it will be technically infeasible or disproportionately expensive to restore polluted groundwater by active intervention. For these reasons it is anticipated that Member States may need to make use of LSOs for groundwater where the effects of pollution will inevitably be long lasting.

2.4 Annex 2.2 (s2.5) of the WFD states that groundwater bodies which are considered likely to require "lower objectives" should be identified on the basis of groundwater levels (A2.2.4) and groundwater quality (A2.2.5) as part of the 2005 Article 5 report on river basin characteristics. No detail concerning the lower objectives themselves is required at this stage.

3. Background to UKTAG Guidance

3.1 This document was prepared to support competent authorities across the UK to provisionally identify groundwater bodies which may require Less Stringent Objectives. This was based on a technical assessment under the characterisation process.

- 3.2 Article 4.5 of the WFD sets out the tests and requirements for defining the groundwater bodies with less stringent objectives (including the consideration of infeasibility and disproportionate costs). These have not been considered in this guidance. As a result the list produced as the result of application this guidance are considered provisional and will change when taking into consideration further technical assessment as part of the river basin planning process as well as future consideration of all of the conditions for setting less stringent objectives required under the WFD.
- 3.3 This paper should be read in conjunction with UKTAG Guidance 13c Principles for an objective setting framework for river basin management planning - 16 November 2004

4. Content of this paper

- Principles underlying this guidance (Section 5.0)
- Approaches to identification of groundwater bodies with LSOs (Section 6.0)

5. Principles underlying the identification process.

- 5.1 The provisional lists identified from the application of this guidance can only be best estimates based on current technical knowledge. It should be recognised that there will be considerable uncertainties associated with making these predictions and the lists will need to change, as new information becomes available.
- 5.2 The less stringent (lower) objectives must be set out in detail and justified in the River Basin Management Plan in December 2009. These objectives must not be set if they are not consistent with; or will compromise the implementation of, other community environmental legislation (refer also to *UKTAG Guidance 13c Draft principles for an objective setting framework (v16-11-04)* and *draft UKTAG guidance 13c) Protected Areas – in progress*).
- 5.3 Only groundwater bodies which are 'at risk' of failing to achieve good groundwater status in 2015 can be considered as potentially requiring a less stringent objective than good status.

6. Technical approaches to identification of groundwater bodies with LSOs

Two technical approaches for pollutant and abstraction pressures are listed below in Section 6.1 and 6.2 respectively.

6.1 Identifying groundwater bodies which require less stringent objectives as a result of pollutant pressures and impacts

- 6.1.1 A simple qualitative approach should be taken at this stage. This is based on identifying particular combinations of sources, pathways and receptors that have been identified as part of the 2004 characterisation process. To ensure consistency, only this data set has been used. Where it is not possible to remove the pollution source (e.g. acid mine drainage or chlorinated solvent contamination), only the source is taken into account. For other pollution scenarios, both the nature of the source and the pathway are considered, including residence times in the unsaturated zone or overlying strata and recovery rates in the saturated zone.
- 6.1.2 Table 1 provides the basic scenarios whereby it is considered unlikely that groundwater bodies can be restored in a relatively short period (ie. before 2027). These are proposed as requiring less stringent objectives.
- 6.1.3 Table 1 can be used in groundwater bodies where the source and geological materials are relatively uniform. In more complex situations, additional considerations may be necessary. Entec (2004)¹ recommended the use of specific risk scores for different

¹ Entec UK Limited, 2004. *Derivation of a Methodology for the Assessment of Groundwater Recovery Times to Achieve Good Status: Tests for Feasibility and Disproportionate Cost. Report prepared for the Scotland and Northern Ireland Forum for Environmental Research.*

pressures and hydrogeological conditions. Under this scheme, groundwater bodies exceeding a certain threshold score would be identified as requiring Less Stringent Objectives. These risk scores and the threshold will then need to be validated against observed data in a small number of groundwater bodies.

Table 1. Scenarios where Groundwater Bodies* are proposed as requiring LSOs

Pressure	Dominant Characteristics of Aquifer / Overlying Strata	Reason
Extensive deep release or dense pollutant	<i>All types</i>	Pollutants can occur extensively at depth, for example, in mining areas or in plumes of dense non-aqueous phase liquid. In these scenarios, pollution will often take decades or centuries to flush out of aquifers.
Surface or shallow release of conservative pollutant	<i>All aquifer types</i> except those aquifers that have: <ul style="list-style-type: none"> a high annual recharge / storage ratio** and a thin unsaturated zone; or a high annual recharge / storage ratio and thin, moderate to high permeability overlying strata**. 	For conservative contaminants such as nitrates, attenuation within a few years is generally only possible in those groundwater bodies that are subject to rapid flushing by recharge.
Surface or shallow release of non-conservative pollutant. Release must be ongoing (e.g. from a residual source within the subsurface).	Aquifers that: <ul style="list-style-type: none"> have a deep unsaturated zone** (which contains the ongoing source), or are overlain by thick, moderate to low permeability overlying strata** (which contains the ongoing source), and/or are dual porosity or intergranular and have a low annual recharge/storage ratio**. 	Long-term retention of non-conservative contaminants will generally only occur where there is both an ongoing source and where conditions are favourable for the long term retention of pollutants. For example, a significant historic pollutant source where a residual mass of contamination occurs within the unsaturated zone of an aquifer.

*Only consider those groundwater bodies which are "at significant risk" or "probably at significant risk" of failing to meet WFD objectives. Only consider those pressures which have made a primary contribution to the risk assessment.

**The assessment must be based on data compiled for the WFD December 2004 risk characterisation. Where these data are insufficient at present, expert judgement should be used in combination with the existing datasets.

6.2 Identifying groundwater bodies which require less stringent objectives as a result of abstraction pressures

6.2.1 Less stringent objectives in relation to the impact of changes in groundwater level are generally only considered if:

- (a) they are associated with significant saline intrusions which would be technically very difficult to restore by 2027, or
- (b) the required reduction in abstraction would be disproportionately expensive or would compromise other environmental objectives. Examples include:
 - Rising groundwater levels beneath major cities. In this situation achieving good quantitative status could mean elevated groundwater levels would have on building foundations and tunnel flooding etc.
 - Long-term mine dewatering. In this situation it may be advantageous for the groundwater body to be maintained at poor quantitative status in the long-term in order to avoid pollution of associated surface waters or of directly dependent terrestrial ecosystems.
 - Groundwater flooding. It may be advantageous to maintain a groundwater body at poor quantitative status in the long-term in order to prevent groundwater flooding.
 - A public water supply abstraction may be impacting on a receptor such as a groundwater dependent terrestrial ecosystem or an associated surface water body and it may be disproportionately expensive to reduce abstraction.